Measuring Poverty

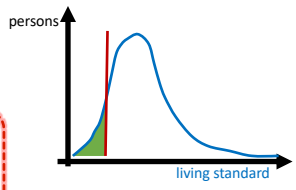
LECTURE 14

Today

- Poverty lines (a conceptual introduction)
  - Subjective vs. objective poverty lines
  - Relative vs. absolute poverty lines
- Poverty measures

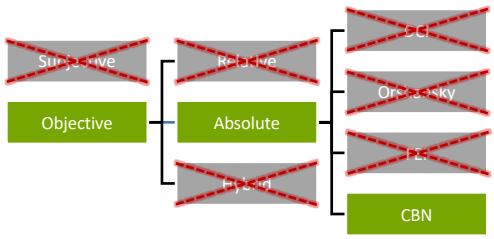
Inequality and poverty measurement

1) a measure of living standards
2) high-quality data on households' living standards
3) a distribution of living standards (inequality)
4) a critical level (a poverty line) below which individuals are classified as "poor"
5) one or more poverty measures



Poverty lines

How to draw a poverty line? An Overview



Subjective poverty lines – I/III

- Poverty lines are inherently subjective judgments people make about what constitutes a socially acceptable minimum standard of living in a particular society at a given time (Ravallion 1994: 42).
- The subjective poverty approach is based on the self-assessed adequacy of a family's food, housing, and clothing.
- How are poverty lines estimated, in practice?

Subjective poverty lines – II/III

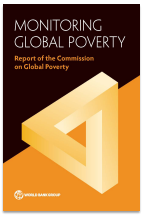
- A surveys can ask the Minimum Income Question (MIQ):
  "What income level do you personally consider to be absolutely minimal? That is to say that with less you could not make ends meet?"
- Another possibility is the Economic Ladder Question (ELQ):
  "Imagine six steps, where on the bottom, the first step, stand the poorest people, and on the highest step, the sith, stand the rich (show a picture of the steps). On which step are you today?"

Subjective poverty lines – III/III

World Bank (2017)

- Recommendation 4:

"The World Bank should explore the use of subjective assessments of personal poverty status (in "quick" surveys of poverty), and of the minimum consumption considered necessary to avoid extreme poverty, as an aid to interpreting the conclusions drawn from the global poverty estimates".



Objective poverty lines

- An objective poverty line is one based on some objective metric, such as consumption or income.

Absolute poverty lines

- An absolute poverty line is one which is fixed in terms of living standards (or welfare).
- Example: cost of a bundle containing "basic commodities", however defined.
- Note 1: 'fixed' is a false friend. An absolute poverty is defined in a specific context and time, that is is fully historically determined. Fixed ≠ unchanging.
- Note 2: 'absolute' is not a synonym of 'low' – an absolute poverty line can be as generous as the analyst or the society wishes.

Relative poverty lines

- A relative poverty line is one which varies with the average standard of living.
- Example: half the mean (or the median) of per capita income.
- The EU definition of relative poverty line:
  "Low income rate after transfers with low-income threshold set at 60% of median [equivalized] income, with breakdowns by gender, age (...)"
- Question: why 60%?
- Answer: I don't know.
  Indicator 11 ("Dispersion around the low income threshold"). Three thresholds: 40, 50 and 70% of the median income.

The problem with relative poverty: the richer…the poorer?

x1	x2	x3	x4	x5	total	mean	poverty line (50% of the mean)	poor
2	2	16	20	60	100	20	10	40%
3	3	24	170	300	500	100	50	60%

An awkward feature of relative poverty lines is that a policy which raises the living standards of all, but proportionally more those of the rich, will increase poverty, notwithstanding the fact that the absolute living standard of the poor has increased!

Duclos J.-Y. (2002) Poverty and equity: theory and estimation. Mimeo

Relative poverty lines

an assessment

- In short, relative poverty = inequality
- In lecture 13 we discussed inequality measures at length – we have better tools for measuring inequality than 'relative poverty' measures
- However… World Bank (2017):

  Recommendation 16: The World Bank should introduce a "societal" headcount ratio measure of global consumption poverty that takes account, above an appropriate level, of the standard of living in the country in question, thus combining fixed and relative elements of poverty

Absolute poverty lines

many popular methods but one key idea: food is the anchor

1) Direct Calorie Intake (DCI)
   Kakwani (2003)
2) Food Energy Intake (FEI)
   Dandekar & Rath (1971) + Greer & Thorbecke (1986)
3) Food-share
   Orshansky (1963, 1965)
4) Cost of Basic Needs (CBN)
   Rowntree (1901) + Ravallion (1994)

The Cost of Basic Needs (CBN) method

- In a nutshell: estimate the cost of a consumption bundle adequate to meet basic consumption needs.
- Question
  What constitutes a 'basic need' and what does not?
- Constraint
  The choice of the basic-needs bundle should reflect local perceptions of what constitutes poverty (specificity).
- Solution
  A safe start consists in including foodstuffs among the basic needs. After, we'll think of how to add an allowance for consumption of non-food goods/services.

The CBN method: A strategy

- Three steps:

1) Estimate the cost of a 'basic food bundle': this gives the food poverty line
2) Estimate the allowance for 'basic non-food goods'
3) Add 2) to 1): this gives the (total) poverty line

The food poverty line (FPL)

- How to define a 'basic food bundle'?
- The key idea, which does not require any arbitrary assumption on consumption patterns, is to:

1) estimate the minimum energy requirement for the average individual in the target population (say 2,000 kcal/person/day)
2) price that amount of calories, using the average cost of one kcal which is computed using the survey data.

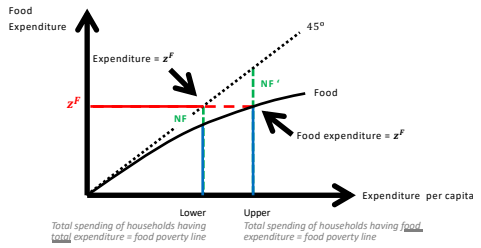
- A monetary amount is obtained, and that is the food poverty line (FPL)
- Note that 3) takes account for local tastes (preferences)

The non-food allowance (NFA)

- How much is the minimum for non-food necessities?
- We start by asking the data
- Focus on a subset of people that are most likely poor and see how much they spend on non-food
- Two way to define that target population:

1) people whose total expenditure is about as much as the food poverty line (lower bound)
2) People whose food expenditure is about as much as the food poverty line (upper bound)

Allowance for non-food goods



C4D2 TRAINING

*Lower bound CBN poverty line

- $PL = FPL + NFA_L$
- $NFA_L = E_h\left(x_h^{nonfood} \middle| x_h \approx FPL\right)$

C4D2 TRAINING

*Upper bound CBN poverty line

- $PL = FPL + NFA_U$
- $NFA_U = E_h\left(x_h^{nonfood} \middle| x_h^{food} \approx FPL\right)$

C4D2 TRAINING

Lower and Upper Bound CBN Poverty Lines

Recap

- $LBPL = FPL + E_h\left(x_h^{nonfood} | x_h \approx FPL\right)$ (lower bound PL)
- $UBPL = FPL + E_h\left(x_h^{nonfood} | x_h^{food} \approx FPL\right)$ (upper bound PL)

- Which one to choose?
- It is customary to report results on them all (FPL, LBPL, UBPL), but if there needs to be one number, it is often based on UBPL

Important remark

- The CBN method hinges on the food poverty line
- A good food poverty line requires good estimates of calorie intake
- Good estimates of calorie intake require a well designed questionnaire (lectures 5-7)

Zambia, 2015

Living Conditions Monitoring Survey

Food item	Unit	Quantity	Unit price	Cost
Cooking oil local	2.5l	1	38	38
Dried beans	1kg	2	13	27
Dried bream	1kg	1	68	68
Dried kapenta	1kg	2	104	207
Fresh milk	500ml	4	5	20
Onion	1kg	4	10	40
Shelled groundnuts	1kg	3	13	39
Table salt	1kg	1	5	5
Tomatoes	1kg	4	5	21
White roller	25kg	3.6	54	194
Vegetables	1kg	7.5	4	29
Total per family (six people or 4.52 AE)				686
Total per AE				152

Source: CSO/World Bank estimations.

Food Poverty Line

Zambia, 2015

Living Conditions Monitoring Survey

The non-food allowance was determined as the average non-food consumption of households whose total consumption was close to the food poverty line:

$$LBPL = FPL + E_h\left(x_h^{nonfood} \mid x_h \approx FPL\right)$$

		2015
Total	*LBPL*	214
	FPL	
Food	Non-food	152
Nonfood	Allowance	62

Note: At average national prices of April/May 2015.
Source: CSO/World Bank estimations.

Poverty measures

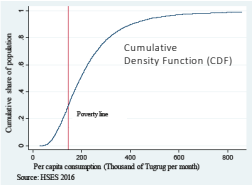
Poverty measures

Basic ideas

- Poverty measures aggregate information.
- A poverty measure is a function of individual incomes $x = (x_1, \ldots, x_n)$ and the poverty line z: $P : R^n \rightarrow R_+$
- The literature on poverty measures is huge and technical in nature. It deals with the choice of the functional form of a suitable poverty index.
- In practice, three indices have taken center stage:
  1) the headcount ratio
  2) the poverty gap index
  3) the poverty gap squared index

The headcount poverty ratio (H)

Mongolia HSES 2016, Cumulative distribution of per capita consumption (p.10)



- The headcount ratio is the proportion of the population that is classified as poor.
- $H = \frac{q}{N} = \frac{1}{N}\sum_{h=1}^{N} I(x_h \leq z)$
- I(·) is an indicator function that is 1 if its argument is true, 0 otherwise.
- Interpretation: incidence of poverty

C4D2 TRAINING

The headcount ratio

Discussion

- Easy to understand
- Insensitive to:
  1) the degree of poverty:
     cut in half every poor's income …H does not change!
  2) the distribution of income among the poor:
     transfer from a poor person to a not-so-poor person (still poor after the transfer) … H does not change!
     transfer from a very poor person to an 'almost-not-poor' person (not poor after the transfer) … H decreases!

C4D2 TRAINING 29

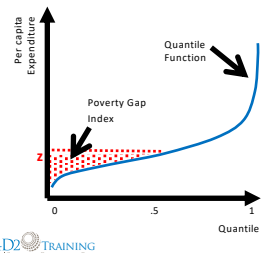
The headcount ratio

In terms of policy

- A transfer to a very poor household would probably leave the headcount index unchanged (if poor remains below the line) even though poverty has overall lessened.
- The easiest way to reduce the headcount index is to target benefits to people just below the poverty line. Policies based on the headcount index might be sub-optimal (Lipton, Ravallion 1993: 24)
- H only shows the effect of poverty-eliminating policies, not poverty-alleviating policies.

C4D2 TRAINING 30

The Poverty Gap (PG) index



- The PG index is defined as the average poverty gap in the population as a proportion of the poverty line (where the non-poor have zero gaps):

$$PG = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{z - x_i}{z}\right) I(x_i \leq z) = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z - x_i}{z}\right)$$

- The poverty gap index (PG) accounts for the depth of poverty: it tells how poor the poor are.

C4D2 TRAINING

The Poverty Gap index

Dismantling the PG index

- Use simple algebra to rewrite PG as follows:

$$PG = H \times I \quad \text{where} \quad I = 1 - \frac{\mu_z}{z}$$

- The term *I* is the 'income-gap ratio', where μ_z is the average income among the poor.
- Neither H nor *I* are – individually taken – 'good' poverty indicators, but are useful building blocks...
- PG combines incidence of poverty (H) with depth (I).

C4D2 TRAINING

The Poverty Gap index

Interpretations

- Suppose PG = 0.20
- Interpretation 1
  "On average, the poor have an expenditure shortfall of 20 percent of the poverty line"
- Now suppose z = $1,000 (poverty line).
- Interpretation 2
  The per capita cost of eliminating poverty is equal to PG × z. In our example: $200 (= 0.20 × 1,000).

C4D2 TRAINING 33

Why do we need to go beyond the PG index?

	α	β	γ	δ	H	PG	PG2
A	1	2	3	9	*0.75*	*0.375*	*0.219*
B	2	2	2	9	*0.75*	*0.375*	*0.188*

poverty line = 4

PG is insensitive to distribution of income among the poor

The Poverty Gap Squared

Definition

- The squared poverty gap index attributes more weight to the poorest among the poor:

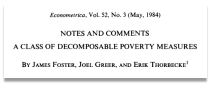
$$PG2 = \frac{1}{N}\sum_{i=1}^{N}\left(1-\frac{x_i}{z}\right)^2 I(x_i \le z) = \frac{1}{N}\sum_{i=1}^{q}\left(1-\frac{x_i}{z}\right)^2$$

- The contribution of the *i*-th individual to PG2 is larger the poorer she is, that is, the larger is her poverty gap $(z- x_i)/z$:

weight gap

$$PG2 = \frac{1}{N}\sum_{i=1}^{q}\left(1-\frac{x_i}{z}\right)\times\left(1-\frac{x_i}{z}\right)$$

A highly influential article



Econometrica, Vol. 52, No. 3 (May, 1984)

NOTES AND COMMENTS

A CLASS OF DECOMPOSABLE POVERTY MEASURES

By James Foster, Joel Greer, and Erik Thorbecke[1]

The headcount ratio, the PG and PG2 all belong to the Foster-Greer-Thorbecke (FGT) class of poverty measures.

FGT (1984)

Definition

The FGT class of poverty measures:

$$P_\alpha = \frac{1}{N}\sum_{h=1}^{N}\left(\frac{z - x_h}{z}\right)^\alpha I(x_h \le z), \qquad \alpha \ge 0$$

α	P_α	Index
0	P_0 = H	HEADCOUNT RATIO
1	P_1 = PG	POVERTY GAP INDEX
2	P_2 = PG2	POVERTY GAP SQUARED
…		
∞	P_∞ weights the poorest person	

C4D2 TRAINING

Lessons learned

1) We argued in favour of objective, absolute, CBN poverty lines
2) Regarding poverty measures:
   - The headcount ratio is a crude and 'theoretically inferior' poverty index. H is useful, but should not be used exclusively.
   - The Poverty Gap Index and the Squared Poverty Gap Index are complements to H; poverty analysis should combine the three measures. We recommend FGT (1984).
   - The axiomatic approach does *not* succeed in identifying the "best" poverty measure. Yet, it is useful, as it reveals the principles underlying the poverty measures.

C4D2 TRAINING 38

References

Required readings

Ravallion M. (2016). The Economics of Poverty: History, Measurement, and Policy Oxford University Press. (Chapters 3, 4, 5.1-5.5).

Suggested readings

Atkinson T., WBG (2017). Monitoring Global Poverty, Report of the Commission on Global Poverty

Deaton, A. (1997). The Analysis of Household Surveys: A Microeconomic Approach to Development Policy. Washington, D.C.: World Bank. Sections 3.1 and 3.2

Deaton, A. and S. Zaidi (2002). Guidelines for Constructing Consumption Aggregates for Welfare Analysis. Living Standards Measurement Study Working Paper N. 135. The World Bank, Washington, DC.

Foster, J., J. Greer, and E. Thorbecke (1984). A Class of Decomposable Poverty Measures, Econometrica, 52, 3: 761-65.

Haughton and Khandker (2009). Handbook on Poverty and Inequality, Chapters 2-4.

Lipton, M., Ravallion, M. (1993). Poverty and policy. Policy, Research working papers ; no. WPS 1130. Poverty and human resources. Washington, DC: World Bank.

Ravallion M. (1994). Poverty Comparisons.

Ravallion M. (2008) Poverty Lines. In: Durlauf S.N., Blume L.E. (eds) The New Palgrave Dictionary of Economics. Palgrave Macmillan, London

Ravallion, M. and B. Bidani (1994). How Robust is a Poverty Profile?, World Bank Economic Review, 8: 75-102.

Sen, A. (1976). Poverty: An Ordinal Approach to Measurement", Econometrica, 44(2): 219-31.

Zheng, B. (1997). Aggregate Poverty Measures, Journal of Economic Surveys, 11(2): 123-62.

C4D2 TRAINING

Thank you for your attention

C4D2 TRAINING

40

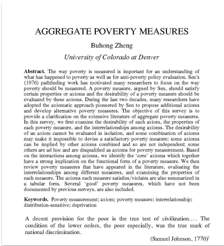
Homework

C4D2 TRAINING

41

Exercise 1 – Engaging with the literature

- What does Zheng (1997) show regarding the Watts index?



AGGREGATE POVERTY MEASURES

Buhong Zheng

University of Colorado at Denver

Abstract. The way poverty is measured is important for an understanding of what has happened to poverty as well as for anti-poverty policy evaluation. Sen's (1976) pathfinding work has motivated many researchers to focus on the way poverty should be measured. A poverty measure, argued by Sen, should satisfy certain properties or axioms and the desirability of a poverty measure should be evaluated by these axioms. During the last two decades, many researchers have adopted the axiomatic approach pioneered by Sen to propose additional axioms and develop alternative poverty measures. The objective of this survey is to provide a clarification on the extensive literature of aggregate poverty measures. In this survey, we first examine the desirability of each axiom, the properties of each poverty measure, and the interrelationships among axioms. The desirability of an axiom cannot be evaluated in isolation, and some combination of axioms may make it impossible to devise a satisfactory poverty measure; some axioms can be implied by other axioms combined and so are not independent; some others are ad hoc and are disqualified as axioms for poverty measurement. Based on the interactions among axioms, we identify the 'core' axioms which together have a strong implication on the functional form of a poverty measure. We then review poverty measures that have appeared in the literature, evaluating the interrelationships among different measures, and examining the properties of each measure. The axioms each measure satisfies/violates are also summarized in a tabular form. Several 'good' poverty measures, which have not been documented by previous surveys, are also included.

Keywords. Poverty measurement; axiom; poverty measure; interrelationship; distribution-sensitive; deprivation

A decent provision for the poor is the true test of civilization.... The condition of the lower orders, the poor especially, was the true mark of national discrimination.

(Samuel Johnson, 1770)[1]

C4D2 TRAINING

42

Exercise 2 – ADePT

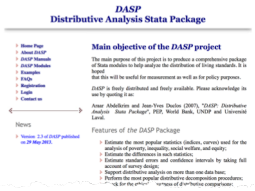
http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTPROGRAMS/EXTADEPT/0,,menuPK:7108381~pagePK:64168176~piPK:64168140~theSitePK:7108360,00.html

- Take any expenditure survey dataset of you interest
- Download ADePT Poverty
- Generate selected poverty measures through the software

C4D2 TRAINING

Exercise 3 – DASP

http://dasp.ecn.ulaval.ca



- Take any expenditure survey dataset of you interest
- Install DASP for Stata
- Generate selected poverty measures through the package

C4D2 TRAINING